

New Law of Electric Conduction

37 j

of the arrangements, and the following more
unexceptionable
form of experiment was adopted.

119. Tin vessels were formed, five inches deep, one inch
and f
a quarter wide in one direction, of different widths from
three-
eighths to five-eighths of an inch in the other, and
open at
one extremity. Into these were fixed by corks, plates of
platina,
so that the latter should not touch the tin cases; and
copper
wires having previously been soldered to the plates, these
were j
easily connected, when required, with a voltaic pile.
Then dis-
tilled water, previously boiled for three hours, was
poured into
the vessels, and frozen by a mixture of salt and snow, so
that ||
pure transparent solid ice intervened between the
platina and
tin: and finally these metals were connected with the
opposite
extremities of the voltaic apparatus, a galvanometer
being at
the same time included in the circuit.

120. In the first experiment, the platina pole was three
inches
and a half long, and } seven-eighths of an inch wide; it was
wholly
immersed in the water or ice, and as the vessel was four-
eighths
of an inch in width, the average thickness of the
intervening
ice was only a quarter of an inch, whilst the surface of
contact
with it at both poles was nearly fourteen square inches.
After
the water was frozen, the vessel was still retained in the
frigo-
rific mixture, whilst contact between the tin and
platina re-
spectively was made with the extremities of a well-
charged
voltaic battery, consisting of twenty pairs of four-inch
plates,
each with double coppers. Not the slightest deflection
of the
galvanometer needle occurred.

121. On taking the frozen arrangement out of the
cold
mixture, and applying warmth to the bottom of the tin
case, so
as to melt part of the ice, the connection with the battery
being
in the meantime retained, the needle did not at first
move; and
it was only when the thawing process had extended so far
as to
liquefy part of the ice touching the platina pole, that
conduction
took place; but then it occurred effectually, and the
galvano-
meter needle was permanently deflected nearly 70°.

122. In another experiment, a platina spatula, five
inches in
length and seven-eighths of an inch in width, had four
inches
fixed in the ice, and the latter was only three-sixteenths
of an

inch thick between one metallic surface and the other;
yet this
arrangement insulated as perfectly as the former.
123. Upon pouring a little water in at the top of this
vessel
on the ice, still the arrangement did not conduct; yet
fluid'
water was evidently there. This result was the
consequence

C